REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended in light of the following discussion is respectfully requested.

Claims 1, 6-18, 24, and 25 are now pending in this application. Claims 9, 10, and 15 are herein amended. Support for the amendments is found at least in the original claims, and in the specification at least at pages 12-14 of the specification. No new matter is added.

In the outstanding Office Action, claims 10-14 were rejected under 35 U.S.C. § 102(b) as anticipated by Olstowski, U.S. Patent No. 3,719,608. Claims 1, 6-9, 15-18, 20, 24, and 25 were rejected under 35 U.S.C. § 103(a) as obvious over Olstowski. Claim 9 was rejected under 35 U.S.C. § 112, second paragraph.

Claims 1, 6-9, 20, 24, and 25 were rejected under 35 U.S.C. § 103(a) as obvious over Olstowski. Applicants respectfully traverse these rejections, as the Office fails to state a prima facie case of obviousness. Claim 1, from which claims 6-9, 20, and 24 depend, is directed to a shaped expanded graphite article having an oxidation-resistant coating layer, at least in its outer layer portion. The oxidation-resistant coating layer has a thickness of 0.5 μm or more, and comprises a boron element and a phosphorus element. The oxidation-resistant coating layer is 15 mass % or more boron element, and 2 mass % or more phosphorus element. The content of the boron element in the oxidation-resistant coating layer is greater than the content of the phosphorous element in the oxidation-resistant coating layer.

Olstowski does not teach or suggest the invention of claim 1 and the claims depending therefrom. Olstowski teaches an oxidation resistant graphite composition. The Olstowski composition comprises an admixture of vermicular graphite with from 0.5 to 10 weight percent either an oxide of boron or an oxide of phosphorus used as an antioxidant. As noted in Example VIII, the Olstowski composition shows good inhibition of oxidation loss at a

temperature of 500°C when vermicular expanded graphite is blended by tumbling with $Ca_3(PO_4)_2$ or B_2O_3. Applicants note that this performance is very different from the present invention, which shows excellent resistance to oxidation loss at temperatures of 800°C or higher.

Olstowski differs from the invention of claim 1, in that it fails to teach or suggest that the coating layer has a thickness of 0.5 μm or more. The Office's assertions to the contrary, Olstowski clearly fails to teach this element. Moreover, Olstowski doesn't teach or suggest that the coating layer is 15 mass % or more boron element, and 2 mass % or more phosphorus element, or that the content of boron element in the coating layer is greater than the content of phosphorous element. With these features, the present invention excels in oxidation resistance at high temperatures. Applicants understand that the claimed combination of boron element and phosphorus element results in the generation of a compound containing phosphorus element and boron element that resists oxidation better than boron element or phosphorus element alone. This is evidenced by the examples in the present application, in which Applicants show that, when boron element alone is used, the rate of oxidation loss is over 50 mass%, and when phosphorus element alone is used, the rate of oxidation loss is over 95 mass%. *See* Comparative Examples 1 and 2, Fig. 1.

The Office asserts that the present invention, in which the inventors claim their discovery of the improved oxidation resistance when the coating layer is 15 mass % or more boron element, and 2 mass % or more phosphorus element, with the content of boron element in the coating layer being greater than the content of phosphorous element, is merely discovery of a result-effective variable. Respectfully, Applicants disagree. A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. *In re Antonie*, 559 F.2d 618,

195 USPQ 6 (CCPA 1977). In this case, there is no evidence of any recognition in the prior art that the mass% of boron element and phosphorus element in an oxidation resistant coating on a graphite article was a result-effective variable. Indeed, Olstowski appear to only teach a combination of the two in passing, with no recognition of mass % of different elements in a combination, and generally teaches using boron element or phosphorus element interchangeably, as opposed to together. Because Olstowski is intended to merely restrain oxidation loss at around 500°C, one of skill in the art would not be lead to use anything other than the disclosed boron element or phosphorus element.

A claimed invention can only be found obvious if there is "some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness." *KSR Int'l v. Teleflex Inc.*, 127 S. Ct. 1727, 1741 (2007) (*quoting In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006). Moreover, every word in a claim must be considered in determining the question of patentability against the prior art. *In re Wilson*, 424 F.2d 1382, 1385 (CCPA 1970). Because the prior art fails to teach or suggest that the coating layer is 15 mass % or more boron element, and 2 mass % or more phosphorus element, with the content of boron element in the coating layer being greater than the content of phosphorous element, and because there is no apparent recognition in the prior art that the relative content of phosphorus element and boron element is a result-effective variable, the cited reference cannot render claim 1, or the claims depending therefrom, obvious. Applicants respectfully request withdrawal of these rejections.

Claims 10-14 were rejected as anticipated by Olstowski, and claims 15-18 were rejected as obvious over Olstowski. Claims 10 and 15 are herein amended. As amended, claim 10, from which claims 11-14 depend, is directed to a method for producing a shaped expanded graphite article having an oxidation-resistant coating layer. The method includes contacting a shaped expanded graphite article with a solution containing a phosphorus

element and a boron element, thereby forming a coating layer of the solution on the article, and then subjecting the graphite article to a heat treatment. Claim 15, from which claims 16-18 depend, is directed to a method for producing a shaped expanded graphite article with an oxidation-resistant coating layer. The method comprises contacting graphite as a material with a solution containing a phosphorus element and a boron element, thereby forming a coating layer of the solution on the graphite. The graphite is subjected to an expanding treatment, and then shaped.

In Olstowski, the expanded graphite article is prepared by blending graphite and an antioxidant, and compressing and shaping the mixture. On the other hand, the method of claims 10-18 includes a step of contacting graphite or a graphite article with a solution containing a phosphorus element and a boron element, thereby coating the graphite or graphite article with a layer containing the antioxidant solution. The Olstowski method does not include forming a coating layer made of an antioxidant on the surface of the graphite or graphite article. Instead, in Olstowski, the graphite and the antioxidant are blended. The surface of the graphite or graphite article therefore is not coated with the antioxidant. Lacking the coating layer, the expanded graphite article prepared through the method of Olstowski likely suffers greater oxidation loss as compared with an expanded graphite article prepared through the method of the present application.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference. *Verdegaal Bros. v. Union Oil Co. of California*, 814 F.2d 628, 631, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987). Because Olstowski does not include forming a coating layer made of an antioxidant on the surface of the graphite article, Olstowski cannot anticipate claim 10 or the claims depending therefrom.

In addition to the differences noted above, claim 15 is further directed to a method for producing a shaped expanded graphite article having an oxidation-resistant coating layer, in which the method comprises contacting graphite as a material with a solution containing a phosphorus element and a boron element, and then subjecting the graphite material to an expanding treatment followed by shaping. With this method, boron element and phosphorus element are present within the shaped expanded article that is formed. This results in oxidation resistance not only on the surface of the formed article, but also throughout the article. Olstowski is different. The Olstowski method teaches, in col. 5, lines 17-28, that the expanded graphite and inorganic antioxidant compounds are blended prior to shaping the article. Olstowski further notes that the inorganic compounds should be in a particulate form which will pass through a 100-mesh screen and, preferably, a 325-mesh screen. Olstowski clearly fails to teach or suggest contacting graphite as a material with an antioxidant in the form of a solution at the time of blending the graphite with the antioxidant. Moreover, Olstowski doesn't teach applying the expanding treatment after the graphite as a material is contacted with the solution, as it teaches blending already-expanded graphite with the antioxidant compounds. Indeed, Olstowski teaches throughout that its method, using expanded graphite, achieves increased anisotropy in the conductivity of the formed article. *See, e.g.*, col. 11, lines 29-35. Such anisotropy is not achieved without using expanded graphite. Accordingly, Olstowski would not lead one of skill in the art to utilize a method not using expanded graphite, and, in fact, teaches away from such a method.

Olstowski does not teach or suggest all of the elements of claim 15. It doesn't teach or suggest anything with regard to contacting graphite as a material with an antioxidant compound before subjecting the mixture to an expanding treatment, with the resultant product of Olstowski thus failing to realize the improved oxidation resistance throughout the formed graphite article, as produced by the claimed method. Moreover, Olstowski teaches

away from such contacting of antioxidant compound without using expanded graphite. Accordingly, Olstowski cannot render claim 15 or the claims depending therefrom obvious. Applicants respectfully request withdrawal of these rejections.

Claim 9 was rejected under 35 U.S.C. § 112, second paragraph. Applicants herewith amend claim 9. It is believed the rejection is obviated by this amendment. Applicants respectfully request the withdrawal of this rejection.

In light of the above discussion, the present application is believed to be in condition for allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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